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ABSTRACT

The paper describes principles and techniques for using microcomputers to enhance the motor development of learning disabled students. Among the guiding principles that the author suggests be kept foremost as educational uses of microcomputers are explored are (1) the fact that microcomputers do not think and cannot replace teachers and (2) that it is important to understand one's own level of computer awareness or literacy. Applications of the microcomputer to develop the individualized education program are noted, including the selection of appropriate long and short term goals. The microcomputer's role in individualizing physical education is also briefly addressed. Benefits to visual-motor and perceptual-motor development are ascribed to computer games. It is suggested that computers can have further applications in assessing such aspects as reaction time, visual tracking, eye-hand coordination, and visual and auditory discrimination. Two additional areas of microcomputer applications, accommodations for severe disabilities and simulation of various activities, are considered. (CL)

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MICROCOMPUTER USES TO PROMOTE PHYSICAL PROFICIENCY AND MOTOR DEVELOPMENT OF LEARNING DISABLED STUDENTS

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We have been in the midst of technological revolutions for a number of years. At the very heart of these revolutions has been the computer, at first mainframe systems and now microcomputers. Microcomputers are rapidly finding their ways into increasing numbers of schools throughout the country. With ready availability of microcomputers it is incumbent upon us as leaders in education to take full advantage of these highly motivating and appealing devices in both special education and physical education.

Many microcomputer applications can be of immense value to learning disabled students, especially in the psychomotor domain. Ones imagination is the only limiting factor in such uses of microcomputers. Continuing advances make microcomputers more powerful than earliest mainframe systems of little more than forty years ago. Increasing memory capacity and speed of operation make potential uses and contributions of these electronic wizards even greater in the future. Competition among companies -- distributors and manufacturers -- is making procurement of microcomputer units well within budgets of virtually all schools and many families.

Some Guiding Principles

As with any major change or new innovation, some individuals are re-

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luctant while others see the computer as a panacea to solve all their problems. Neither extreme is correct nor appropriate. Several principles and factors need to be considered and kept foremost as microcomputers are explored and introduced in educational programs and activities of all types.

. A computer is little more than a calculator with memory. However, capacity and complexity of the memory, speed and power at which the microcomputer can be accessed, make exciting results not only possible but routine and rather commonplace.

. A computer does not think; it merely does what told, which can be vastly different from what is intended or desired. An old but true expression applies to computers -- GIGO (garbage in, garbage out).

. Not all activities and tasks are as appropriate or efficient when computerized as when done manually or in other non-computerized ways; determine tasks that are appropriate and efficient opposed to those which are inappropriate and inefficient -- don't simply change mode of presentation from paper and pencil to microcomputer unless there are sound reasons and justifications; interest and motivation can be such factors because of possibilities for reinforcement through immediate feedback and knowledge of results.

. Novelty factors and considerations of microcomputer use have not been determined -- what happens to a child's

new found interest and motivation when the microcomputer becomes old hat?

. Computers will and cannot replace teachers anymore than the advent of chalkboards, books, and audiovisual materials; some teacher roles and functions should be augmented by this new and powerful tool available for our use.

. Getting appropriate software or programs to meet exact and specific needs may be difficult; however, do not compromise your needs simply to get software which is not what is really needed or desired. Be prepared to develop your own programs so that they are tailored specifically to your uses -- don't overlook students as valuable and competent resources in the programming process.

. Real differences exist between being computer aware and being computer literate -- know your stage and level of development but continue to grow and progress. As an individual who daily deals with attacking problems in systematic ways, or as one who applies processes such as the scientific method, systems analysis, and task analyses, you already have basics for developing logic and flow of programs -- coding is the process by which individuals translate program logic and flow into language the microcomputer can understand and activate. Within this context one individual can program and not code, while another

individual can code and not program.

- Computer programming can in and of itself be a valuable experience and tool in working with learning disabled children and adults in that the process forces one to be systematic and work in small and manageable bites (pardon the pun). Success and positive feedback are immediate so as to help redirect the failure-frustration cycle so prevalent in both learning disabled children and adults.

COMPUTERS AND THE PSYCHOMOTOR DOMAIN

Often overlooked are many ways in which computers can be used in the psychomotor domain. Computers can contribute directly to an individual's development of physical and motor fitness, development of fundamental motor skills and patterns, and development of skills in aquatics, dance, individual and group games and sports. Some uses and applications of computers in the physical and motor areas are little different than typical uses in classrooms and other educational settings. On the other hand, some specific and unique microcomputer applications can be beneficial in the physical and motor areas.

Individualized Education Programs

Individualized education programs can be required and necessary in physical education as in other areas in which exceptional education students have special needs. While I do not feel any computer can generate a valid and truly personalized IEP, a microcomputer can facilitate the process and reduce some of the tedium and time associated with the IEP process.

When personal information about a child is fed into the computer along with other relevant information including assessment results, a list of long-term goals appropriate for the individual can be obtained from a data bank of such goals stored in computer memory and coded for retrieval. However, selection of specific objectives to be used with a given child must be left to the IEP team and human decisions guided by personal experience, professional knowledge and cooperative teamwork among parent, teacher, and administrator.

Once long-term goals have been selected, short-term instructional objectives can be retrieved from a data bank in the computer memory. Again selection of the most relevant and appropriate of these objectives remains the responsibility of the human team. The same process can be followed in obtaining potential activities, feasible methods, and possible adaptations for specific purposes for each student. Input from and experiences of people in many different places can ultimately impact upon each child through computer use.

Once all elements and provisions of the IEP are determined, the computer can contribute to and streamline procedures further. Data about performances can be processed into the computer so that progress can be monitored and presented in many different ways including a variety of graphic displays.

Information generated by and selected for the computer can now become basis for reporting to parents and others interested in the child. Time saved by using a computer for different administrative, routine, and repetitive tasks is important and should not be minimized. Time that does not have to be devoted to non-instructional tasks enables teachers and leaders to spend more time in effecting their primary responsibilities and missions -- making more efficient and effective learning situations and circumstances

for each and every student.

Individualizing Instruction

Computers can be valuable in other ways for individualizing instruction in the psychomotor domain. For example computers can be used in analyzing performances of all types -- level of aerobic achievement, pace in running/jogging activities, progressions in weight training, criteria reached in various fundamental and sport skill activities. Projections to target improvement for different instructional periods of time can help students better understand what is expected in terms of concrete objectives for which they are striving in any physical or motor task.

Such concrete information can be extremely motivating to students and assist in their systematic approach and movement toward specific, tangible, and attainable goals. Regardless of activity, skill level, age, background, and/or experience of individual students, computers can be used as important adjuncts and tools in personalizing instruction in all subject areas, including physical education.

Educational Uses of Games

Educational uses of computer games should not be overlooked and routinely rejected as bad and of no value. Each game must be critically reviewed and objectively evaluated in terms of its potential contributions for attaining and furthering certain concepts, skills, and competencies. For example, various visual-motor and perceptual-motor characteristics are required to be successful in many computer games including PAC-MAN. Some students show great dexterity, well developed laterality and/or directionality, excellent eye-hand coordination, and extraordinary ability in motor planning while playing these games. Many of these same youngsters

do not show mastery of the same visual-motor and perceptual-motor characteristics to anywhere near the same degree in other activities requiring their use. In fact, some of these individuals may be extremely poor in applying such characteristics in other settings and under different circumstances.

Two important but still unanswered questions must be kept in mind and investigated regarding educational uses of games.

- Motivation -- If students can be motivated and challenged in more traditional educational settings to the same degree as when playing computer games, would compensate performances result in these other settings and activities requiring the same visual-motor and/or perceptual-motor characteristics?

- Specificity -- Because of the specific nature of learning, is it possible that success in computer games means an individual is simply skilled in this mode?

Answers to these questions are vital since they can be the stimulus to increasing concerted action and activity for more and different computer applications. Or these answers can make us take another step back to evaluate and re-evaluate real uses of and potential for computers in the instructional process.

Sport Games

Sport games can also be used for educational purposes. Learning situations can be developed and structured so that participants (players) can learn many things about a sport. Rules, terminology, basics of the sport, techniques, strategies, courtesies are but a few specifics which can be presented to students in this highly motivating and interesting way.

These same sport games can be used to stimulate interest by the individual in the game as both a participant and a spectator.

Assessment

Computers can be used in many ways in assessment processes. Certain tests can be administered on the computer. Some applications relative to knowledge and information feedback are obvious and will not be dealt with further in this presentation. However, the computer can be used for various tests designed to assess functions and performances in different physical and motor tasks. Reaction time, both visual and auditory, visual tracking, eye-hand coordination, visual discrimination, auditory discrimination are just a few traits that can be presented through computers. This not only brings assessment and program close together, but makes it possible for teachers to be more actively involved in the assessment process. Through such multiple uses of the computer, necessity to purchase many costly assessment packages and kits will be greatly reduced furthering the economy fostered through microcomputer use.

Accommodating Severe Disabilities

Task and activities impossible for some students with certain handicapping conditions can become routine with computers. Game paddles, nothing more than electrical switches, can be replaced by mercury or microswitches, or even photoelectric cells, to activate the computer. Thus an individual who cannot for whatever reason use a typical keyboard can access and activate the computer with these devices. Such devices can be developed so that an individual can use them with arm stumps, feet, squeezing, breath control, or by blinking the eyes. If a photoelectric cell is used, only its beam needs to be penetrated to activate the computer.

In addition to uses in assessment and in performing various tasks, the computer can store information about performances, successes and failures on different trials, status and trends -- an ongoing monitor for both quantity and quality of performances. Immediate feedback can be highly motivating, especially for hard to reach individuals. Smiling faces, stars, and other positive visual feedback on the screen along with verbal reinforcement from a voice synthesizer can do wonders for the ego and self-concept of a child who has been trapped in a negative failure-frustration cycle.

Simulation

Simulation of various activities by computer has many possible uses and applications. Simulation can be especially helpful and valuable when introducing certain new activities, including those of an adventure, risk, or outdoor education nature. Guiding a small craft over a specified course so as to avoid dangerous areas and not to ground on rocks can be accomplished on a computer screen. Rappelling, traversing a creek or stream on rocks are additional examples of simulation in risk or adventure activities. Literally nothing is out of the realm of possibility!

Computer simulations have many possible applications for driver education. Is it possible that the computer will replace the driver education simulator which was patterned after the Link trainer for aircraft? Regardless, computers will open doors to new vistas and opportunities for students of all ages to become more confident and competent drivers under a greater variety of conditions and circumstances.

A Brighter Future

Computers have already been instrumental in helping paraplegics and

quadriplegics use bicycle ergometers (exercise bikes) and take a few tenuous and tedious steps in laboratory settings. Electrical stimulation of intact muscles has been computer controlled so input stimuli have been consistent with neuro-muscular patterns needed for these specific movements. The day is not far off when some of these individuals will be locomoting independently right in our midst! Feats of this type make one realize that the time is rapidly approaching when truly there will be no impossible dreams!

However, to meet these challenges and make them realities, necessitate that professionals in involved disciplines become actively involved in both planning and programming processes. Personnel in data processing, decision sciences, and related technical disciplines do not have background and experience to give them understanding of intricacies and subtlies of topics and areas about which they are developing software. It is easier, more feasible, and results in sounder and more appropriate and productive programs when they are developed by professionals from respective disciplines. Personnel from various educational specializations can master computer programming and coding more easily and readily then those from data processing can become truly conversant in education. Another viable possibility is to have personnel from these disciplines working together as an efficient and effective coordinated team.

Computers are here to stay. Their uses make it possible to do things that would and could not be considered without them. Students will continue to come to us with increasing experience and sophistication in computer uses and applications of all types. Even today we can benefit and learn from the background and experience of our students. If you haven't taken that first byte, it is long overdue as valuable time is being lost. Not only will you find computers intriguing and satisfying but quite addicting.